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TO THE ASSISTANT COMMISSIONER FOR PATENTS:

Transmitted herewith is a patent application identified as follows:

First-named inventor: Dean J. Blackketter

Title: "Communicating Scripts in a Data Service Channel of a Video Signal"

(X)   Original Patent Application.

( )   Continuing Application (prior application not abandoned):

    ( )   Continuation   ( )   Divisional   ( )   Continuation-in-part (CIP)

    of prior application No: _____ Filed on: _____.

    ( )   A statement claiming priority under 35 USC § 120 has been added to the specification.

Enclosed are:

21	pages of Specification and Title Page
5	pages Claims
1	page Abstract
6	pages of Formal Drawings
2	pages Declaration/Power of Attorney (unsigned)
4	pages PTO-1449 form
1	copy of each cited reference (10 references)
X	Transmittal letter (in duplicate)
X	A check for filing fee ($1,102.00)
X	Return Receipt Postcard

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1 COMMUNICATING SCRIPTS IN A DATA

2 SERVICE CHANNEL OF A VIDEO SIGNAL

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5

6 TECHNICAL FIELD

7   The invention relates generally to supplementing

8 broadcast television programming with information of

9 interest to broadcast viewers.

10

11 BACKGROUND OF THE INVENTION

12   The Internet is a worldwide collection of networks and

13 gateways. The Internet includes a backbone of high-speed

14 data communication lines between major nodes, consisting of

15 thousands of commercial, government, educational, and other

16 computer systems, that route data and messages. The World

17 Wide Web (the Web) is a collection of formatted hypertext

18 pages located on numerous computer systems around the world

19 that are logically connected by the Internet. The Web has

20 become a valuable resource for information relating many

21 subjects.

22   Web browsers, software providing user interfaces to

23 the Web, allow individuals to access Internet content from

24 personal computers. Internet terminals, such as those

25 pioneered by WebTV Networks, Inc., the assignee of the

26 present invention, have made the Web accessible to an even

27 larger segment of the population by providing Web access

28 without a personal computer. Internet terminals (also

29 commonly referred to as set-top boxes) provide Web access

30 using an ordinary television (TV) set as a display and a

31 remote control or wireless keyboard for user input.

1   Figure 1 illustrates a basic configuration of an

2   Internet system and broadcast television network 100.

3   Network 100 includes a pair of clients 110 and a

4   receiver/client 112. Receiver/client 112 is so named

5   because it operates both as a television receiver and as an

6   Internet client. Hereafter, receiver/client 112 is referred

7   to as receiver 112 for simplicity.

8   Clients 110 and receiver 112 are coupled to a modem

9   pool 120 via direct-dial, bi-directional data connections

10   130, which may be telephone (POTS, i.e., "plain old

11   telephone service"), cable, satellite forward channels,

12   ISDN (Integrated Services Digital Network), or any other

13   similar type of connection. Modem pool 120 is typically

14   coupled to a number of remote servers 140 via a network

15   infrastructure, such as the Internet 160. An additional

16   server 150 specifically supports receiver 112.

17   Clients 110 and receiver 112 communicate bi-

18   directionally with servers 140 and 150 through modem pool

19   120 and the Internet 160. Modem pool 120 is typical of

20   those found today throughout the world providing access to

21   the Internet and private networks. In addition to

22   communicating with servers 140 and 150, receiver 112

23   receives broadcast data and video from a broadcast

24   television network 170 via, e.g., antennas 175 or a cable

25   network (not shown).

26   Figure 2 illustrates an embodiment of receiver 112.

27   Receiver 112 includes set-top box 200, an ordinary analog

28   television set 210, and a remote control 220. Set-top box

29   200 may be integrated with television set 210. Television

30   set 210 displays video data, including a graphical user

31   interface, conveyed from set-top box 200 by a video link

2

1 230. Video link 230 is an RF (radio frequency), S-video,

2 composite video, or other video link.

3   Set-top box 200 includes hardware and software for

4 receiving and decoding a broadcast video signal 240, such

5 as an NTSC, PAL, SECAM, or other TV system video signal,

6 and for providing video data to the television set via

7 video link 230. Set-top box 200 also includes hardware

8 and/or software for providing a user with a graphical user

9 interface 250 capable of displaying Web pages (e.g., HTML

10 or XML pages) and broadcast video. User interface 250 can

11 notify the user of the presence of encoded data embedded in

12 the video signal. The notification may be audible, visual,

13 or a combination of the two. For example, user interface

14 250 might temporarily display an icon in a portion of the

15 screen.

16   Set-top box 200 may include both a standard modem and

17 an ISDN modem, such that the communication link between

18 set-top box 200 and server 150 (Figure 1) can be either a

19 telephone (POTS) connection 260 or an ISDN connection 270.

20 Set-top box 200 receives power through a power line 280.

21   A user operates remote control 220 to control set-top

22 box 200 in browsing the Web, sending e-mail, and performing

23 other Internet-related functions. Set-top box 200 receives

24 commands from remote control 220 via an infrared (IR)

25 communication link 290. A keyboard (not shown) may also be

26 included.

27

28   EXEMPLARY RECEIVER SYSTEM ARCHITECTURE

29   Figure 3 is a block diagram illustrating internal

30 features of set-top box 200. Set-top box 200 is controlled

31 by a processing unit, such as central processing unit (CPU)

32 300, which is coupled to an Application-Specific Integrated

1   Circuit (ASIC) 310. ASIC 310 contains circuitry that

2   implements certain features provided by set-top box 200.

3   ASIC 310 is coupled to an audio digital-to-analog converter

4   (DAC) 320 that provides audio output to television 210.

5   ASIC 310 is also coupled to a video encoder 330 that

6   provides video output to television 210. An IR interface

7   335 detects IR signals transmitted by remote control 220

8   and, in response, provides corresponding electrical signals

9   to ASIC 310. A standard telephone modem 340 and/or an ISDN

10   modem 342 are coupled to ASIC 310 to provide connections

11   260 and 270, respectively, to the Internet.

12   A television (TV) interface 345 conveys broadcast

13   video signals to ASIC 310, allowing video data carried in

14   broadcast video signal 240 to be presented to a viewer on

15   TV 210. TV interface 345 also extracts other data that may

16   be embedded in the video signal. The data so extracted, or

17   a portion thereof, may be displayed concurrently with a

18   television program. For example, analog broadcast signals

19   typically include a portion known as the vertical blanking

20   interval (VBI) that is used to transmit, among other

21   things, closed captioning information. Data inserted into

22   the VBI are extracted by TV interface 345 and displayed on

23   the TV 210.

24   Set-top box 200 also includes read-only Memory (ROM)

25   350, a random-access memory 355, and a mass storage device

26   360. ROM 350 stores program code for application software

27   executed by CPU 300. RAM 355 serves as temporary storage

28   for CPU 300 as CPU 300 executes instructions. Mass storage

29   device 360 may be used to input software or data to set-top

30   box 200 or to store information received either from

31   network connections or from broadcast signals. Mass storage

1 device 360 includes any suitable data storage medium, such

2 as magnetic tapes, magnetic disks, and optical disks.

3   A number of companies support appliances similar to

4 receiver 112 to enhance broadcast television with Internet

5 content. For example, Intel® Intercast® technology offers a

6 VBI inserter that enables content creators to insert Web

7 pages into the VBI of a broadcast signal. Dedicated

8 receiver platforms then sample the VBI of the broadcast

9 signal to obtain and display the Web pages. Unfortunately,

10 the bandwidth of the VBI is limited, so content-rich Web

11 pages can be slow to broadcast. As a result, content

12 updates can be undesirably slow.

13   WebTV® for Windows® is similar to Intercast®

14 technology, but has the ability to update information

15 presented by a broadcast Web page by broadcasting a script

16 capable of interacting with the Web page. Targeted

17 receivers receive the script and store the script in memory

18 for later use. The content creator then causes the script

19 to be executed by broadcasting a message that identifies

20 the stored script and the Web page with which the script is

21 to interact.

22   The broadcasting techniques of WebTV® for Windows®

23 work well to update information presented by Web pages.

24 However, the processes of downloading, storing, and later

25 triggering a script are collectively complex and time

26 consuming. Further, such scripts are not themselves

27 incorporated into the language defining Web pages, but

28 instead remain separate from the Web pages with which they

29 interact. Broadcast scripts can therefore alter the image

30 presented by a Web page but are limited in their ability of

31 change the functionality of the page.

32

1 SUMMARY OF THE INVENTION

2   The present invention is directed to methods and

3 apparatus for enhancing an information resource, such as a

4 Web page, simultaneously residing in memory on a number of

5 remote receivers.

6   Web pages are authored using HTML, for "Hypertext

7 Markup Language." HTML uses tags to mark elements, such as

8 text and graphics, in a document to indicate how web

9 browsers should display these elements to the user and

10 respond to user actions. HTML pages may also include one or

11 more scripts that allow HTML page authors to dynamically

12 control the interaction and behavior of their pages.

13   For purposes of the present invention, the HTML tags

14 and scripts of a given Web page define the "context" of

15 that page. This context is distinct from the visual image

16 provided by a page, which can vary between two identical

17 HTML pages depending upon a receiver's interpretation of

18 the page and upon the resources referred to by the page.

19 For example, a tag within an HTML page may refer to an

20 image that is independent of the page: altering the image

21 will change the visual representation of the page without

22 changing the context of the page. The present invention

23 allows content creators to alter both the visual

24 representation of a given page and the context of the page

25 by allowing content creators to broadcast scripts directed

26 to specified Web pages.

27   In accordance with the invention, a content creator,

28 (e.g., a program producer, broadcaster, affiliate, cable

29 company, or satellite provider), embeds a trigger in a data

30 service channel of a broadcast video signal. The embedded

31 trigger includes a resource identifier unique to a targeted

32 information resource and a script capable of modifying the

6

1   information resource. The script might be a script or a

2   segment of a script written in a scripting language, such

3   as JavaScript™, ECMAScript, JScript™, or VBScript. Such

4   scripts allow content creators to provide interaction

5   between an information resource and a viewer, to control

6   the receiver, and to dynamically create HTML content.

7   The script-bearing triggers (hereafter "script

8   triggers") are broadcast in the data service channel of a

9   broadcast video signal. Each receiver adapted to interpret

10   trigger content begins with an information resource, such

11   as a Web page, resident in memory. The receiver can obtain

12   such a resource via the Internet, broadcast video, or from

13   local storage. The receivers, tuned into the appropriate

14   broadcast signal, monitor the data service channel of that

15   signal for triggers that are directed to the information

16   resource resident on the receiver. Upon receipt of such a

17   script trigger, the receiver executes the script contained

18   within the trigger to alter the information resource and/or

19   displayed video defined by the resource.

20   Other features of the present invention will be

21   apparent from the accompanying drawings and from the

22   detailed description that follows.

23

24   <u>BRIEF DESCRIPTION OF THE DRAWINGS</u>

25   Figure 1 (prior art) illustrates a basic configuration

26   of an Internet system network 100.

27   Figure 2 (prior art) illustrates an embodiment of a

28   receiver/client 112 for displaying broadcast television and

29   Internet content.

30   Figure 3 (prior art) is a block diagram illustrating

31   internal features of a set-top box 200.

7

1   Figure 4 illustrates a communication system 400,

2   including five content receivers 405-409 configured in

3   accordance with the invention.

4   Figure 5 is a flowchart depicting a method for

5   synchronizing broadcast video data with information

6   resources residing in memory on a number of remote

7   receivers.

8   Figure 6 is a flowchart depicting a method performed

9   by a receiver configured in accordance with the invention

10   to respond to script triggers.

11

12   DETAILED DESCRIPTION OF THE INVENTION

13   Figure 4 illustrates a communication system 400,

14   including five content receivers 405-409 configured in

15   accordance with the invention. Communication system 400

16   also includes two content sources, a web server 410 and a

17   television broadcaster 415, and a conventional television

18   417. Web server 410 communicates with each of receivers

19   405-407 via the Internet 420, while broadcaster 415

20   communicates to each of receivers 405-409 and television

21   417 via a broadcast signal 421. Internet 420 is understood

22   to include all modems, lines, and other intervening

23   components required to communicate between server 410 and

24   receivers 405-407.

25   Each of receivers 405-409 is configured to display Web

26   pages, broadcast television, or both. Web pages are

27   typically downloaded over the Internet, but may also be

28   received from a broadcast television signal or retrieved

29   from a local memory source, such as a disk drive. In each

30   case, however, the Web pages are stored locally on the

31   receivers.

8

1   Receiver 405 displays a "Sports Page" Web page 422

2 along with a broadcast baseball game 424. In accordance

3 with the invention, a portion of web page 422, game score

4 426, for example, can be updated in response to a script

5 received from broadcaster 415. Sports page 422 can thus be

6 synchronized with baseball game 424 without connecting to

7 the Internet. Updating just a portion of sports page 422

8 advantageously requires less bandwidth than updating the

9 entire page.

10   Receiver 406 illustrates another advantage of this

11 embodiment. Receiver 406 includes broadcast video 426 and a

12 "Local Forecast" page 428. Web page 428 includes a form

13 field 430 inviting a user to enter a local zip code. In

14 accordance with the illustrated embodiment, broadcaster 415

15 can provide periodic script triggers including scripts that

16 interact with the zip code to provide weather updates

17 specific to the selected zip code. Such updates might

18 include textual weather information or graphics, such as

19 weather symbol 432. A number of scripting languages support

20 this type of interaction between a page and the user.

21 Exemplary scripting languages include JavaScript,

22 ECMAScript, JScript™, and VBScript. Alternatively,

23 broadcaster 415 can modify page 428 to include additional

24 functionality by broadcasting a script for incorporation

25 into page 428.

26   The following text is HTML code defining Local

27 Forecast page 428. The HTML code includes a script entitled

28 "Zip Code Weather" at <http://www.weatherzip.com/page.html>

29 for accepting a zip code and responding to script triggers

30 directed to particular zip codes. The script is written

31 using the ECMAScript scripting language.

32

```
1   <HTML>
2   <HEAD><TITLE>Zip Code Weather</TITLE></HEAD>
3   <BODY>
4
5   <SCRIPT>
6   function newWeather(zip, weather) {
7      if (zip == zipForm.userZip)
8          weatherPic.src = weather + ".gif";
9   }
10  </SCRIPT>
11
12  <P>Your Zip: <FORM NAME=zipForm><INPUT TYPE="text"
13  NAME="userZip"></FORM></P>
14
15  <P>Today's Weather: <IMG NAME=weatherPic
16  SRC="sunny.gif"></P>
17
18  </BODY>
19  </HTML>
20
```

21   The foregoing weather script can be included in an

22 original broadcast of page 428 or can be appended to page

23 428 using a script trigger that includes the requisite

24 script (i.e., the portion of the foregoing HTML code

25 between and including the <SCRIPT LANGUAGE> and </SCRIPT>

26 tags). In either case, once page 428 includes the script a

27 content creator can update page 428 to include a local

28 forecast for zip code 98502 by broadcasting the following

29 exemplary script trigger:

30

31   <http://www.weatherzip.com/page.html>[script:newWeather

32   ("94114","snow)][464c]

1
2 The "URL" field (separated by angle brackets) identifies
3 the target page, while the script field identifies the
4 script and related arguments to be passed to the target
5 page. The final field includes a checksum value for error
6 detection. The specifics of script-trigger syntax are
7 described below.
8   Receivers 407 and 408 illustrate yet another advantage
9 of this embodiment. Receivers 407 and 408 each illustrate
10 an example in which a user simultaneously views broadcast
11 baseball game 424 and a "Business News" page 434. Business
12 News page 434 might be in information resource associated
13 with a particular business channel or program that
14 periodically broadcasts script triggers to news page 434
15 that provide timely stock prices for a series of companies,
16 each company identified by a symbol.
17   Business News page 434 includes a form field 436 that
18 invites a user to enter a symbol corresponding to a public
19 company. In the depicted example, receiver 407 includes the
20 symbol MSFT in form field 436, while receiver 408 includes
21 the symbol BA. Receiver 407 then receives and displays the
22 MSFT stock price upon receipt of a script trigger directed
23 to page 434 and specifying the symbol MSFT; similarly,
24 receiver 408 receives and displays the BA stock price upon
25 receipt of a script trigger directed to page 434 and
26 specifying the symbol BA. Thus, instead of requiring a
27 broadcaster to display all stock prices, individual users
28 can adapt their environments to suit their own tastes.
29   A displayed television channel need not be related to
30 a displayed web page. For example, receiver 407 can tune
31 into two channels simultaneously so that a user can watch a
32 television program on one channel (e.g., baseball game 424)

1 while receiver 407 monitors the second channel for

2 enhancements to business page 434. Tuners capable of

3 monitoring two or more channels simultaneously are well

4 known in the art.

5 In each of the foregoing examples, the receiver

6 responded to some input from the user. The invention is

7 not, however, limited to interactive applications. For

8 example, receiver 409 is shown simultaneously displaying a

9 television show 438 and an airline page 440. Broadcaster

10 415 can cause airline page 440 to be updated by

11 transmitting a script trigger to page 440 without requiring

12 any user interaction. In the example, airline page 440

13 includes a text field 442 advising the viewer that San

14 Francisco International Airport (SFO) is closed due to fog.

15

16 SCRIPT TRIGGERS

17 Having described an exemplary environment in which

18 script triggers may be employed, script-trigger syntax and

19 usage will now be discussed. Trigger messages, or

20 "triggers," are instructions broadcast to receivers of

21 broadcast video. Such triggers generally instruct receivers

22 to take a specific action to synchronize the content of a

23 Web page with a broadcast television program. For purposes

24 of the present invention, "script triggers" are triggers

25 that include a script or a portion of a script capable of

26 enhancing a specified information resource.

27 Script triggers include a resource locator, a script

28 or a portion of a script, and may also include a human-

29 readable name and an expiration time. The resource locator

30 addresses a particular resource to be enhanced by the

31 trigger. In the example of receiver 405 of Figure 4, script

12

1 triggers intended to enhance sports page 424 would include

2 a resource locator specific to sports page 422.

3   A resource locator commonly associated with Web

4 content is the Uniform Resource Locator (URL). A URL is a

5 compact string representation of a location used to

6 identify an abstract or physical resource on the Internet.

7 Of course, alternative means of uniquely identifying

8 content may be employed. For example, it is appreciated

9 that keys (e.g., database indices), network addresses

10 (e.g., IP addresses), and other identification mechanisms,

11 alone or in combination, may be employed to uniquely

12 identify a selected resource. Therefore, while the term URL

13 refers to a specific type of content identifier used in

14 connection with the Web, the term uniform resource

15 identifier is used herein to refer to content/resource

16 identification mechanisms generally.

17

18   SCRIPT-TRIGGER SYNTAX

19   Script triggers may be transmitted in the VBI of an

20 analog broadcast video signal. The text service channels of

21 line 21 of the VBI provide a robust communication medium,

22 albeit at relatively low bandwidth. In some embodiments of

23 the invention, triggers are text based, and their syntax

24 follows a basic format that complies with the Electronic

25 Industries Association EIA-746A, "Transport of Internet

26 Uniform Resource Locator (URL) Information Using Text-2 (T-

27 2) Service" (September 1998), which is incorporated herein

28 by reference. EIA-746A defines the formatting necessary to

29 transmit Internet URLs using the vertical-blanking interval

30 of a broadcast television signal, and is incorporated

31 herein by reference.

1   In one embodiment that complies with EIA-746A, each

2 script trigger includes a URL followed by zero or more

3 attribute/value pairs and an optional checksum, as follows:

4

5 $<url>$ $[attr_1:val_1]$ $[attr_2:val_2]$ ... $[attr_n:val_n]$ $[checksum]$

6

7 The URL is enclosed in angle brackets. For example, the URL

8 "http://sports.com/scores.html" might identify sports page

9 422, indicating that a given trigger is intended to update

10 page 422.

11   The attribute/value pairs can be selected to achieve

12 some desired interaction with the specified resource. A

13 script attribute, formatted as [script:string], provides a

14 script or script fragment to execute within the context of

15 the page identified by the URL. For example,

16 [script:report_stock("MSFT", "$92/SH")] might be directed

17 to business page 434 to update the stock price displayed to

18 those users specifying MSFT, or to introduce some new

19 functionality to page 434 by amending page 434 to include

20 an additional script. The "string" value is written as an

21 ECMAScript fragment in one embodiment, but can be written

22 in any number of scripting languages.

23   A "name" attribute, provides the user with readable

24 text. For example "[name:SFO CLOSED DUE TO FOG]" could be

25 used to alert a users as described above in connection with

26 receiver 409. The "name" attribute and the "script"

27 attribute can each provide text messages such as that

28 illustrated on airline page 440. The script attribute is

29 more powerful, however, because scripts can be used to

30 modify the context of page 440. For example, scripts can be

31 broadcast to receiver 406 to incorporate field 430 and the

32 script that provides page 428 with the ability to provide

14

1 local weather information. Script attributes allow content

2 creators to improve their Web pages without broadcasting

3 complete new pages.

4   A time stamp indicating a time after which the trigger

5 expires follows an "expires" attribute. One embodiment

6 employs the form *yyyymmddThhmmss*, where the capital letter

7 "T" separates the date from the time. The *time* string may

8 be shortened by reducing the resolution. For example

9 *yyyymmddThhmm* (no seconds specified) is valid, as is simply

10 *yyyymmdd* (no time specified at all). When no time is

11 specified, expiration is at the beginning of the specified

12 day. The expires attribute can be abbreviated as the single

13 letter "e" (e.g. [e:19971223]). The "expires" attribute

14 ensures that information contained in triggers is timely.

15 Without this attribute, a rebroadcast of a show might

16 provide an incorrect update, for example an erroneous stock

17 quote.

18   A checksum may be appended to the end of the logical

19 address link to detect data corruption that may occur

20 during receipt or transmission of a trigger. A two-byte

21 hexadecimal checksum is employed such as a checksum that

22 would be produced by the standard TCP/IP checksum algorithm

23 described in Request For Comments (RFC) 719, "Internet

24 Protocol," September 1981, which is incorporated herein by

25 reference. According to one embodiment, the checksum is

26 computed by pairing adjacent characters in the string

27 (starting with the first delimiter) to form 16-bit

28 integers. If there is an odd number of characters, the

29 final character is paired with a byte value of zero. The

30 checksum is computed such that the one's complement sum of

31 all of the 16-bit integers plus the checksum equals the 16-

32 bit integer with all 1 bits.

1   For a detailed discussion of the above-described

2 trigger syntax, see the Advanced Television Enhancement

3 Forum Specification (ATVEF), Versions 1.1 revision 26,

4 (2/2/99), which is incorporated herein by reference.

5

6   TRIGGER RECEIVER OBJECTS

7   Some embodiments of the invention require that

8 intended target resources include a trigger receiver

9 object. The trigger receiver object, implemented by the

10 receiver, processes triggers in the context of the resource

11 containing the trigger object. See the above-incorporated

12 ATVEF specification for a detailed discussion of trigger

13 objects, including their syntax and use in accordance with

14 an embodiment of the invention.

15

16   BROADCAST METHOD

17   Figure 5 is a flowchart depicting a method employed by

18 a content creator (e.g., a program producer, broadcaster,

19 affiliate, cable company or satellite provider) to

20 synchronize broadcast video data with information resources

21 stored locally on a number of remote receivers. The

22 information resources are, in one embodiment, Web pages

23 (e.g., HTML or XML pages). Information resources are

24 typically displayed, but this is not necessarily the case.

25 For example, a content creator might want to update locally

26 stored pages while the user is watching another channel, or

27 even while the video display is turned off. A user would

28 thus be presented with timely information each time the

29 user selected a particular information resource without

30 having to connect to the Internet or wait for the selected

31 channel to broadcast the latest content.

1   In accordance with the invention, the content creator

2 first creates a script trigger (step 500) using, for

3 example, the syntax described above. Next, the broadcaster

4 embeds the script trigger into a data service channel of

5 some broadcast signal (step 510). In one embodiment, the

6 broadcast video signal is a National Television Standards

7 Committee (NTSC) video signal including a vertical blanking

8 interval (VBI), and the data service channel is selected

9 from a captioning service channel of a text service

10 channel. The video signal may also be Phase Alternate Lines

11 (PAL), Sequential Couleur Avec Memoire (SECAM), High

12 Definition Television (HDTV), or a digital video signal

13 such as a Digital Video Broadcasting (DVB) signal or an

14 Advanced Television Systems Committee (ATSC) signal.

15   Where the broadcast video signal is NTSC video signal,

16 the trigger can be imbedded into line 21 of the vertical

17 blanking interval (VBI). The protocols for broadcasting

18 data in line 21 of the VBI call for relatively robust, low-

19 speed communication. Higher bandwidth can be obtained using

20 other lines of the VBI. Finally, the broadcaster broadcasts

21 the script trigger (step 520).

22   The upstream video may contain previously encoded data

23 in line 21 of the VBI. Each content creator is therefore a

24 potential re-encoding point along the broadcast

25 distribution path. At any re-encoding point, the existing

26 data may be extracted from the captioning data channel or

27 the text service channel of the video signal. Subject to

28 certain bandwidth limitations, the content creator may then

29 embed one or more script triggers into a captioning or text

30 service packet of the video signal. The video signal may

31 then be transmitted to the next downstream receiving

32 device(s). This process may be repeated during video signal

17

1 processing at each point along the video signal

2 distribution path.

3   The foregoing broadcast methods are embodied in

4 machine-executable instructions, which can be used to cause

5 a general-purpose or special-purpose processor programmed

6 with the instructions to perform the steps. Alternatively,

7 the steps might be performed by specific hardware

8 components that contain hardwired logic for performing the

9 steps, or by any combination of programmed computer

10 components and dedicated hardware.

11

12   RECEIVER METHOD

13   Figure 6 is a flowchart depicting a method performed

14 by a receiver configured in accordance with the invention

15 to respond to script triggers. First, the receiver stores

16 an information resource, such as a web page, locally in the

17 receiver (step 600). The information resource can be stored

18 in video memory for immediate display or elsewhere in

19 memory, for example on a magnetic hard disk. The receiver

20 can obtain the resource from any number of information

21 sources, such as from a server on the Internet, from a

22 broadcast signal, or from a local memory device, such as a

23 hard-disk drive or CD ROM drive.

24   Next, in step 610, the receiver monitors one or more

25 broadcast channels for valid script triggers directed to

26 the stored information resource. For example, where the

27 information resource is identified by a URL, the receiver

28 monitors broadcast video for script triggers that include a

29 URL matching that of the information resource. A valid

30 script trigger is one that is encoded in a predetermined

31 syntax, such as the syntax described earlier, and whose

32 resource locator and attribute/value pairs are not

18

1   corrupted, as determined by a comparison of a checksum

2   generated by the receiving device to the checksum

3   accompanying the script trigger. The receiver ignores

4   invalid script triggers.

5   Upon receipt of a valid script trigger matching the

6   information resource (step 620), the receiver determines

7   whether the resource locator associated with the script

8   trigger matches that of the information resource (decision

9   630). If not, the receiver disregards the script trigger

10 (step 640) and continues monitoring the broadcast channel.

11 If, on the other hand, the resource locator associated with

12 the script trigger matches that of the receiver, then the

13 information resource executes the script or script fragment

14 within the script trigger (step 650) and continues

15 monitoring the broadcast channel (step 610).

16 The foregoing receiver methods are embodied in

17 machine-executable instructions, which can be used to cause

18 a general-purpose or special-purpose processor programmed

19 with the instructions to perform the steps. Alternatively,

20 the steps might be performed by specific hardware

21 components that contain hardwired logic for performing the

22 steps, or by any combination of programmed computer

23 components and dedicated hardware.

24

25   REFERENCES

26 The following references provide additional background

27 information relating to the present invention, and are

28 incorporated herein by reference.

29 1.   W3C, "HTML 4.0 Specification," chapters 1-18 (April

30   1998), identified as page "http://www.w3.org/TR/REC-

31   html40/".

2. ECMA - European association for standardizing information and communication systems, "Standard ECMA-262, 2nd Edition" (August 1998), the ECMAScript Language Specification.

3. W3C, "Document Object Model (DOM) Level 1 Specification" (October 1998), identified as page http://www.w3.org/TR/1998/REC-DOM-Level-1-19981001/DOM.txt.

4. R. Panabaker, S. Wegerif, and D. Zigmond, "The Transmission of IP Over the Vertical Blanking Interval of a Television Signal," (February 1999), identified as page "http://www.ietf.org/internet-drafts/draft-ietf-ipvbi-nabts-02.txt".

5. S. Deering, "Host Extension for IP Multicasting" (August 1989).

6. J. Postel, "User Datagram Protocol," (August 1980), identified as page "ftp://ftp.isi.edu/in-notes/rfc768.txt".

7. Triggers: EIA-608, Recommended Practice for Line 21 Data Service: Electronic Industries Association EIA-608, "Recommended Practice for Line 21 Data Service" (September 1994).

8. Request For Comments (RFC) 791, "Internet Protocol, DARPA Internet Program Protocol Specification" (September 1981).

While the present invention has been described in connection with specific embodiments, variations of these embodiments will be apparent. For example, while described in connection with video signals, the invention is equally applicable to non-video broadcast applications like digital radio.

20

1   Therefore, the spirit and scope of the appended claims

2   should not be limited to the foregoing description.

1 <u>CLAIMS</u>

2 What is claimed is:

3

4 1. A method comprising:

5   a. storing, in a receiver, an information resource

6   identified by a first resource identifier;

7   b. monitoring a data service channel of a broadcast

8   signal for a script trigger, wherein the script

9   trigger includes a second resource identifier and

10   a script; and

11   c. executing the script on the receiver, upon

12   receipt of the script trigger, if the second

13   resource identifier matches the first resource

14   identifier of the information resource.

15

16 2. The method of Claim 1, further comprising displaying

17 the information resource stored in memory.

18

19 3. The method of Claim 1, wherein the information

20 resource is a Web page.

21

22 4. The method of Claim 1, wherein the information

23 resource comprises tags that define a context of the

24 resource, and wherein the script modifies the context.

25

26 5. The method of Claim 4, wherein the Web page further

27 includes a second script.

28

29 6. The method of Claim 1, wherein the script is a

30 fragment of a second script resident on the

31 information resource.

32

1 7.   The method of Claim 6, wherein the script fragment
2   comprises a command to the second script.
3
4 8.   The method of Claim 1, further comprising displaying a
5   video portion of the broadcast signal, wherein the
6   script trigger synchronizes the information resource
7   with the video portion of the broadcast signal.
8
9 9.   The method of Claim 1, wherein the broadcast signal
10   comprises video data, and wherein the script trigger
11   induces an enhancement of the information resource.
12
13 10.   The method of Claim 1, wherein the first and second
14   resource identifiers are URLs.
15
16 11.   A method for synchronizing a broadcast signal and an
17   information resource simultaneously residing on a
18   plurality of remote receivers, the method comprising:
19   a.   embedding a script trigger in a data service
20   channel of the signal, the script trigger
21   including:
22   i.   a resource identifier unique to the
23   information resource; and
24   ii.   a script for updating the information
25   resource; and
26   b.   broadcasting the signal.
27
28 12.   The method of Claim 11, wherein the signal is
29   broadcast to a second plurality of receivers in
30   addition to the first-mentioned plurality of
31   receivers, and wherein the information resource does
32   not reside on the second plurality of receivers.

1

2   13.   The method of Claim 11, wherein the data service

3   channel is a captioning service channel.

4

5   14.   The method of Claim 11, wherein the information

6   resource includes a second script, and wherein the

7   first-mentioned script passes a value to the second

8   script.

9

10   15.   The method of Claim 11, wherein the broadcast signal

11   is a National Television Standards Committee (NTSC)

12   video signal including a text or data-service channel.

13

14   16.   The method of Claim 15, wherein the data service

15   channel is line 21 of the NTSC video signal.

16

17   17.   The method of Claim 11, wherein the broadcast video

18   signal is selected from a group consisting of Phase

19   Alternate Lines (PAL), Sequential Couleur Avec Memoire

20   (SECAM), High Definition Television (HDTV), a Digital

21   Video Broadcasting (DVB) signal, or an Advanced

22   Television Systems Committee (ATSC) signal.

23

24   18.   The method of Claim 11, further comprising generating

25   a checksum for the resource identifier and the script

26   and inserting the checksum into the script trigger.

27

28   19.   A method comprising:

29   a.   embedding a script trigger in a data service

30   channel of a video signal, the data service

31   channel selected from a captioning service

32   channel or a text service channel, the script

1   trigger complying with a predetermined syntax and

2   including a resource identifier and a script; and

3   b.   broadcasting the video signal.

4

5   20. A machine-readable medium having stored thereon data

6   representing sequences of instructions, wherein the

7   instructions, when executed by a processor, cause the

8   processor to:

9   a.   embed a script trigger in a data service channel

10   of a signal, the script trigger including:

11   i.   a resource identifier unique to an

12   information resource; and

13   ii. a script for updating the content of the

14   information resource; and

15 b.   broadcast the signal.

16

17 21. A machine-readable medium having stored thereon data

18 representing sequences of instructions, wherein the

19 instructions, when executed by a processor, cause the

20 processor to:

21 a.   display an information resource identified by a

22   first resource identifier;

23 b.   monitor a data service channel of a broadcast

24   video signal for a script trigger, wherein the

25   script trigger includes a second resource

26   identifier and a script; and

27 c.   execute the script, upon receipt of the script

28   trigger, if the second resource identifier

29   matches the first resource identifier of the

30   information resource.

31

25

1   22.   The machine-readable medium of Claim 21, wherein the

2   information resource is a Web page.

3

4   23.   The machine-readable medium of Claim 21, wherein the

5   instructions cause the process to display a video

6   portion of the broadcast video signal, and wherein

7   executing the script trigger synchronizes the

8   information resource with the video portion of the

9   broadcast video signal.

10

11   24.   The machine-readable medium of Claim 21, wherein the

12   first and second resource identifiers are URLs.

13

14   25.   The machine-readable medium of Claim 21, wherein the

15   information resource includes a second script, and

16   wherein the instructions cause the process to pass a

17   value to the second script upon receipt of the script

18   trigger.

19

20   26.   An appliance comprising:

21   a.   a video display adapted to display a video image

22   and an information resource identified by a first

23   resource identifier;

24   b.   means for monitoring a data service channel of a

25   broadcast video signal for a script trigger,

26   wherein the script trigger includes a second

27   resource identifier and a script; and

28   c.   means for executing the script, upon receipt of

29   the script trigger, if the second resource

30   identifier matches the first resource identifier.

ABSTRACT OF THE DISCLOSURE

Described are methods and apparatus for enhancing an information resource, such as a Web page, simultaneously residing in memory on a number of remote receivers. A content creator, (e.g., a program producer, broadcaster, affiliate, cable company or satellite provider), embeds a trigger in a data service channel of a broadcast signal. The trigger includes a resource identifier unique to the information resource and a script capable of modifying the information resource. The script might be a script or a segment of a script written in a conventional scripting language. Each receiver that includes the targeted information resource monitors the data service channel of the broadcast video signal for script-bearing triggers directed to that resource. If a receiver receives a script-bearing trigger directed to the resident resource, the receiver executes the script contained within the trigger to alter the resource and/or the displayed video defined by the resource.
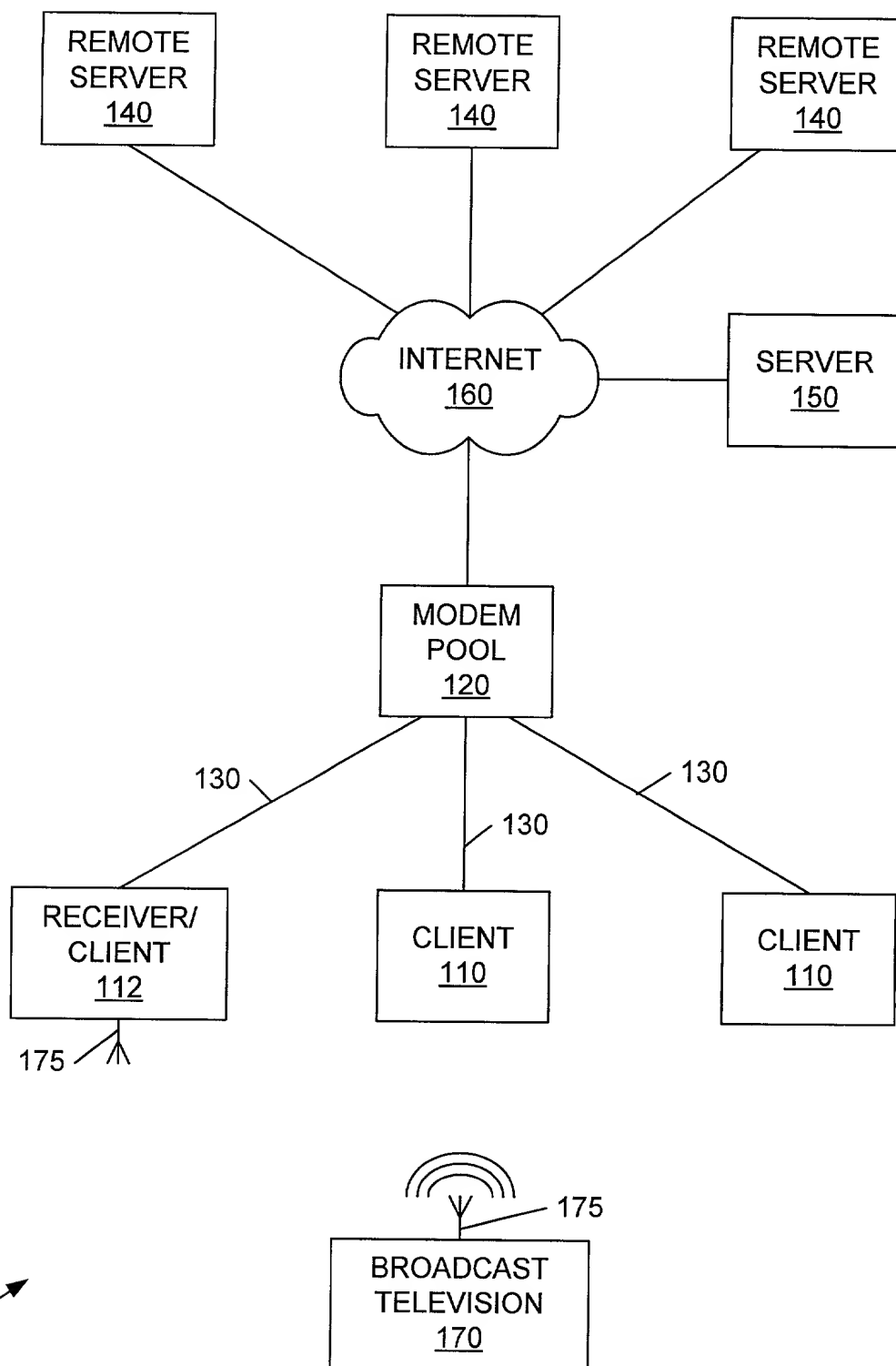
FIG. 1
(PRIOR ART)

FIG. 2
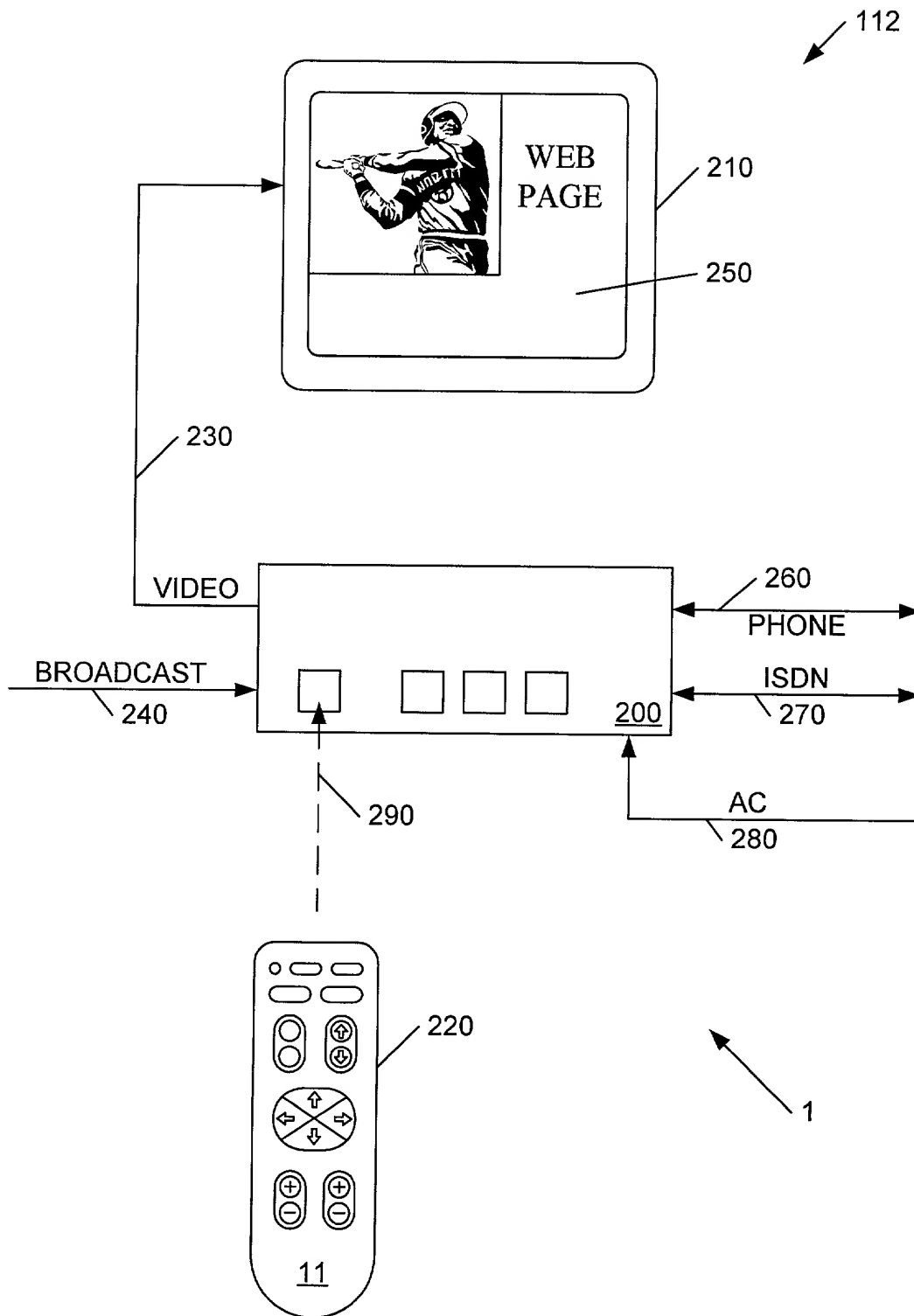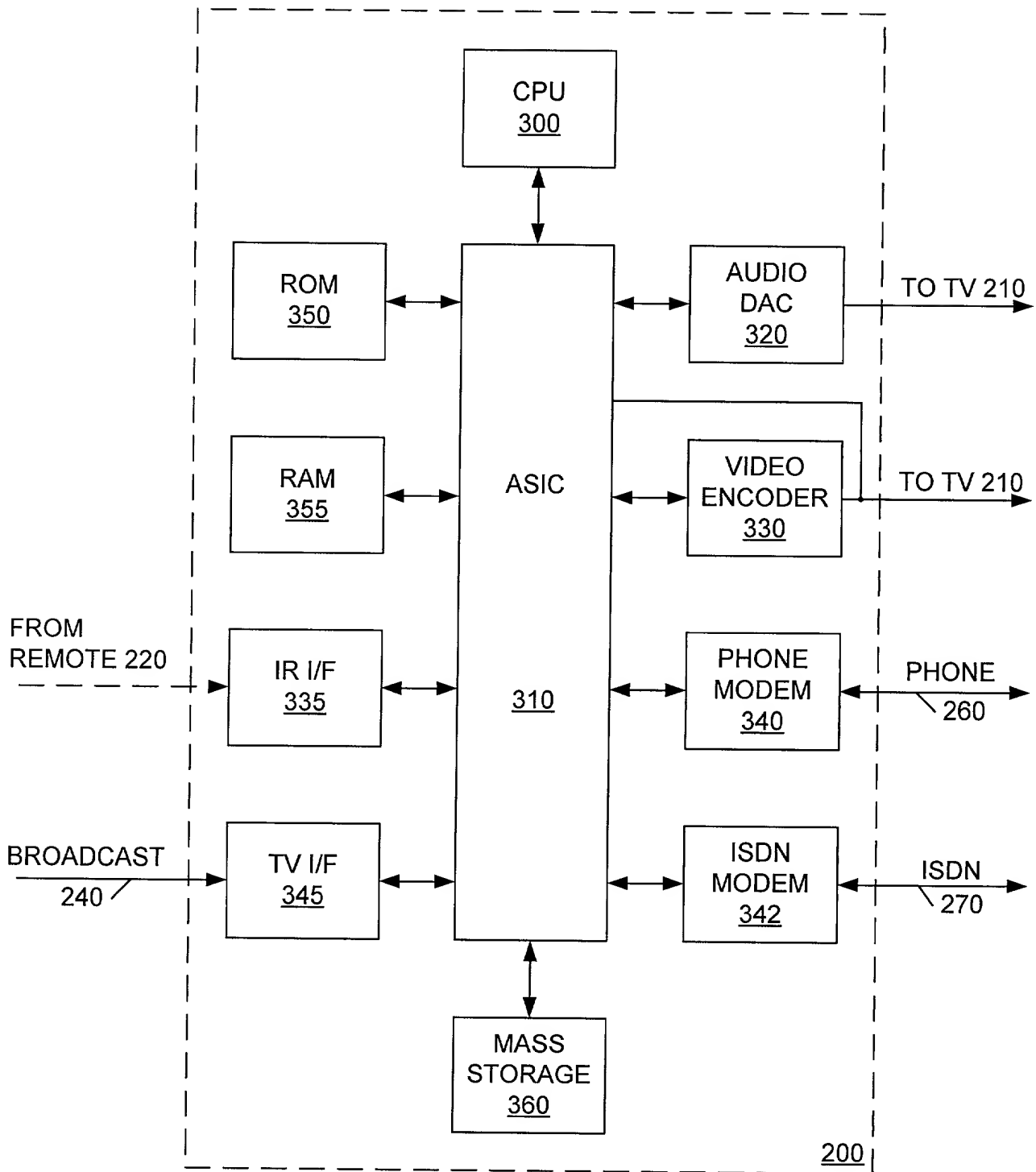(PRIOR ART)

FIG. 3

(PRIOR ART)

FIG. 4

FIG. 5

```
                    START

            600    STORE INFORMATION
                   RESOURCE LOCALLY ON
                   RECEIVER

            610    MONITOR CHANNEL FOR
                   SCRIPT TRIGGER

            620    RECEIVE SCRIPT
                   TRIGGER

            630    TRIGGER URL =        NO    DISREGARD
                   INFORMATION RESOURCE        SCRIPT TRIGGER
                   URL?                        640

                   YES

                   EXECUTE SCRIPT
                   650
```
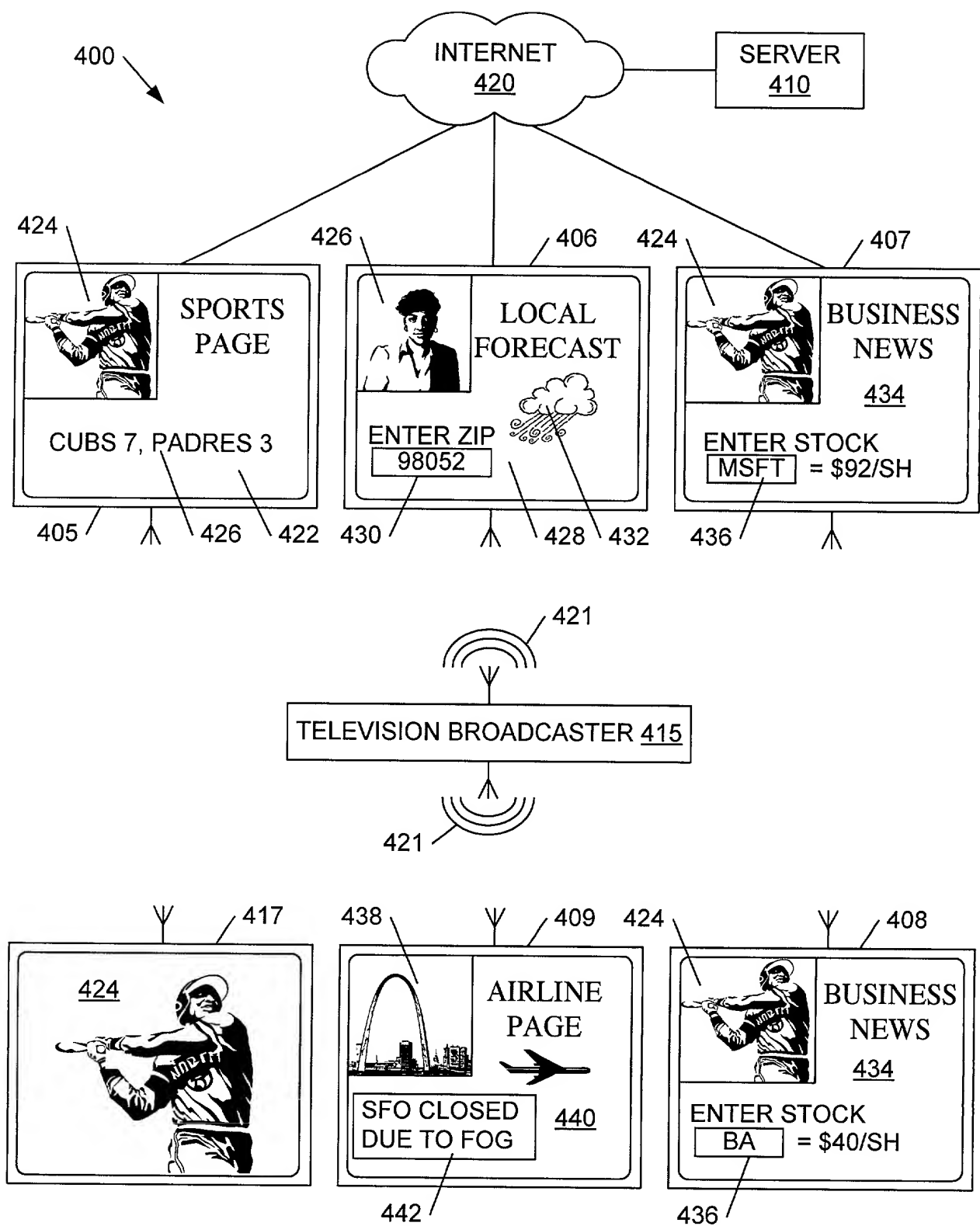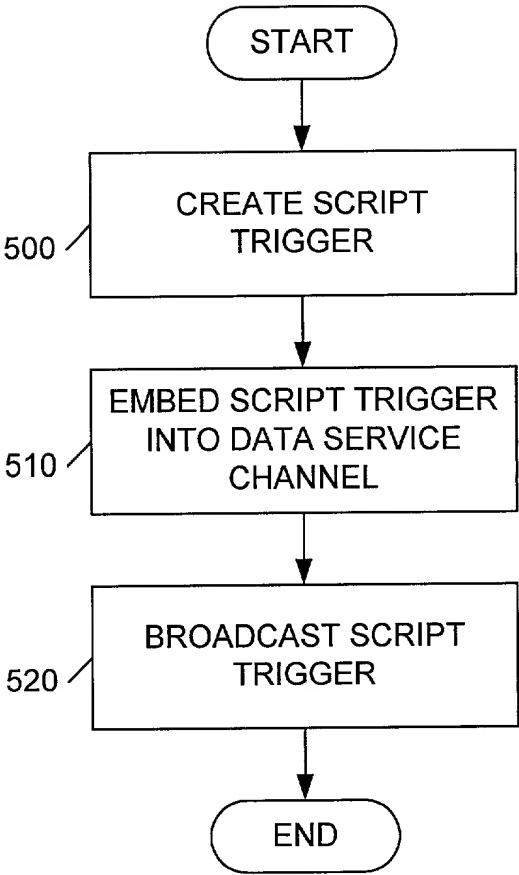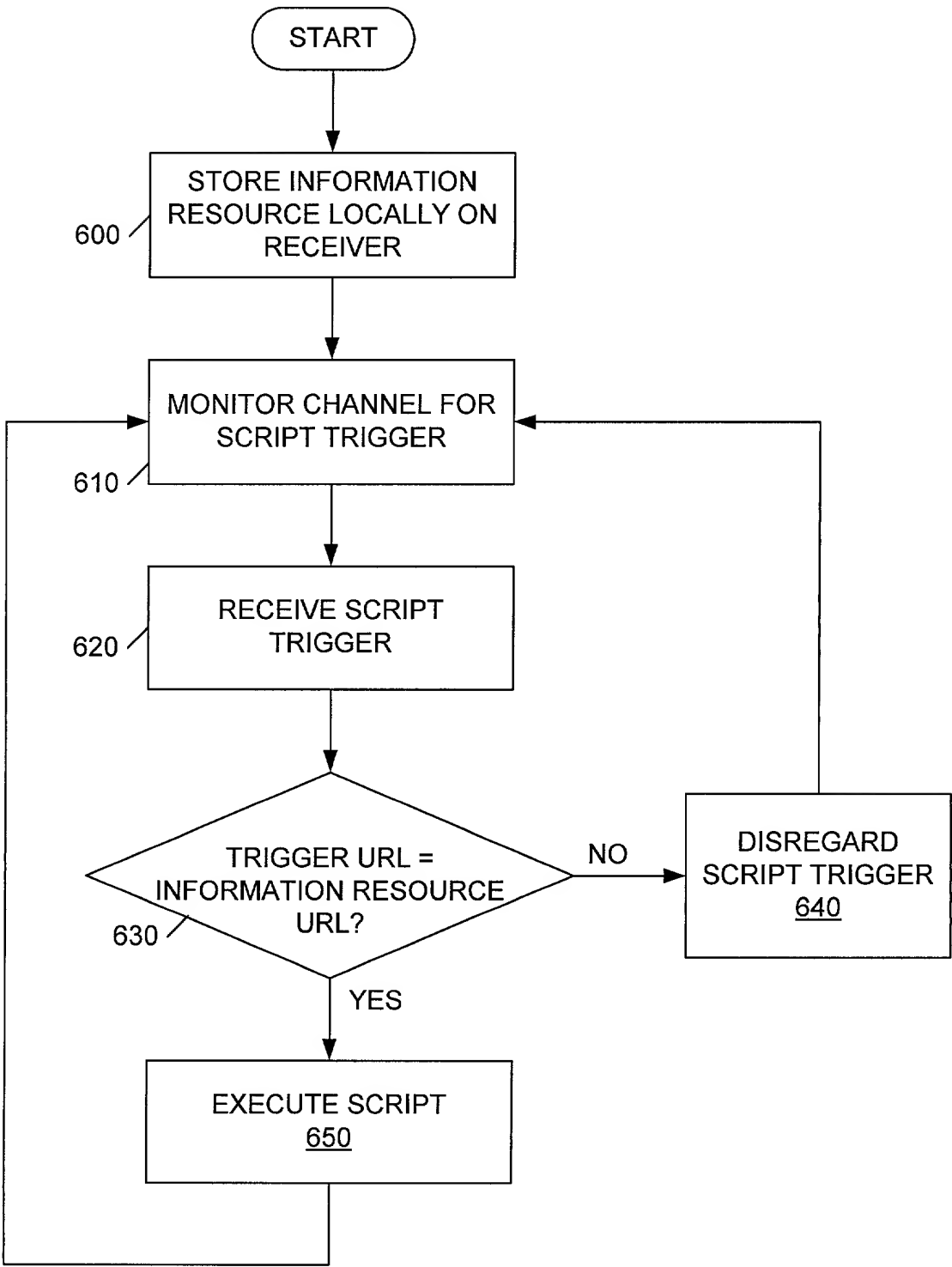
FIG. 6

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post-office address, and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below), or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought by way of the application entitled:

"Communicating Scripts in a Data Service Channel of a Video Signal"

which (check)   __X__   is attached hereto.
                       ____   and is amended by the Preliminary Amendment attached hereto.
                       ____   was filed on _____ as Application Serial No. _____.
                       ____   and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate, or any PCT international application(s) designating at least one country other than the United States of America listed below, and have also identified below any foreign application(s) for patent or inventor's certificate or an PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) on which priority is claimed:

APPLICATION NUMBER	COUNTRY	DAY/MONTH/YEAR FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
N/A			YES:____ NO:____
			YES:____ NO:____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE
N/A	

U.S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) or PCT international application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)
N/A		

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) listed below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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